

# 1.4

## Sketching Intersections

**Goal** Sketch simple figures and their intersections.

### VOCABULARY

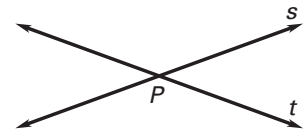
**Intersect** Figures intersect if they have any points in common.

**Intersection** The intersection of two or more figures is the point or points that the figures have in common.

### POSTULATE 3: INTERSECTION OF TWO LINES

**Words** If two lines intersect, then their intersection is a point.

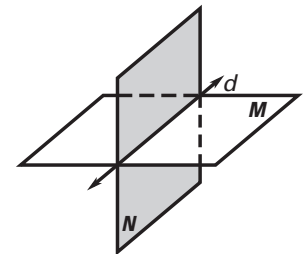
**Symbols** Lines  $s$  and  $t$  intersect at point  $P$ .



### POSTULATE 4: INTERSECTION OF TWO PLANES

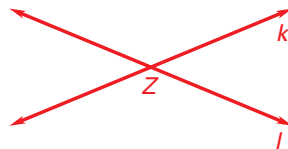
**Words** If two planes intersect, then their intersection is a line.

**Symbols** Planes  $M$  and  $N$  intersect at line  $d$ .

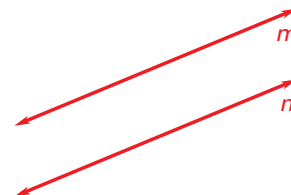


### Follow-Up

Draw lines  $k$  and  $\ell$  that intersect at point  $Z$ .



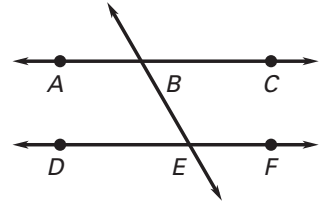
Draw lines  $m$  and  $n$  that do not intersect.



**Example 1** Name Intersections of Lines

Use the diagram at the right.

- Name the intersection of  $\overleftrightarrow{AC}$  and  $\overleftrightarrow{BE}$ .
- Name the intersection of  $\overleftrightarrow{BE}$  and  $\overleftrightarrow{DF}$ .
- Name the intersection of  $\overleftrightarrow{AC}$  and  $\overleftrightarrow{DF}$ .

**Solution**

- $\overleftrightarrow{AC}$  and  $\overleftrightarrow{BE}$  intersect at point B.
- $\overleftrightarrow{BE}$  and  $\overleftrightarrow{DF}$  intersect at point E.
- $\overleftrightarrow{AC}$  and  $\overleftrightarrow{DF}$  do not appear to intersect.

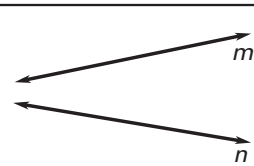
**Follow-Up**

In Example 1, do you think that  $\overleftrightarrow{AC}$  and  $\overleftrightarrow{DF}$  will ever intersect? Explain.

No. They always stay an equal distance apart.

In the figure at the right, do you think that lines  $m$  and  $n$  will ever intersect? Explain.

Yes. You can extend the lines to the left, and they will intersect.

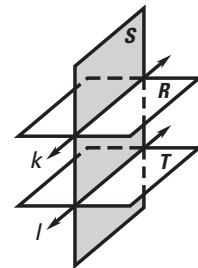
**Example 2** Name Intersections of Planes

Use the diagram at the right.

- Name the intersection of planes  $S$  and  $R$ .
- Name the intersection of planes  $R$  and  $T$ .
- Name the intersection of planes  $T$  and  $S$ .

**Solution**

- Planes  $S$  and  $R$  intersect at line  $k$ .
- Planes  $R$  and  $T$  do not appear to intersect.
- Planes  $T$  and  $S$  intersect at line  $l$ .



✓ **Checkpoint** Use the diagram shown.

1. Name the intersection of  $\overleftrightarrow{PS}$  and  $\overleftrightarrow{QR}$ .

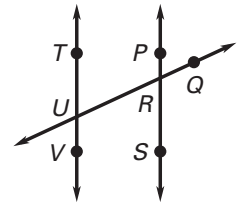
point *R*

2. Name the intersection of  $\overleftrightarrow{TV}$  and  $\overleftrightarrow{QU}$ .

point *U*

3. Name the intersection of  $\overleftrightarrow{PS}$  and  $\overleftrightarrow{UV}$ .

no intersection



Use the diagram shown.

4. Name the intersection of planes *X* and *Y*.

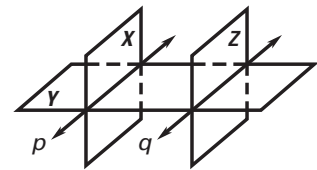
line *p*

5. Name the intersection of planes *Y* and *Z*.

line *q*

6. Name the intersection of planes *Z* and *X*.

no intersection



### Example 3 Sketch Intersections of Lines and Planes

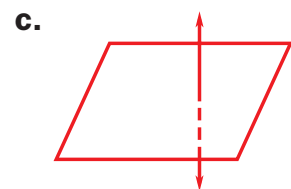
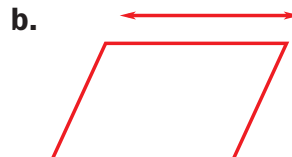
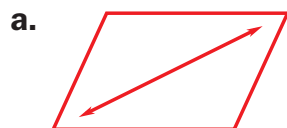
Sketch a plane. Then sketch each of the following.

a. a line that is in the plane

b. a line that does not intersect the plane

c. a line that intersects the plane at a point

**Solution**

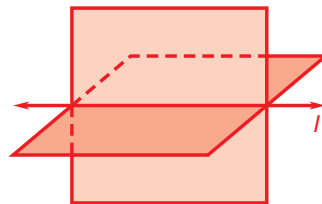


**Example 4** *Sketch Intersections of Planes*

Sketch two planes that intersect in a line.

**Solution**

1. Draw one plane as if you are looking straight at it. Shade the plane.
2. Draw a second plane that is horizontal. Shade this plane a different color.
3. Draw the line of intersection. Use dashed lines to show where one plane is hidden.

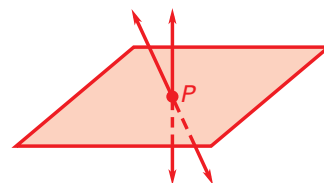
**Follow-Up**

Try to sketch two planes that intersect in exactly one point. Why is this impossible?

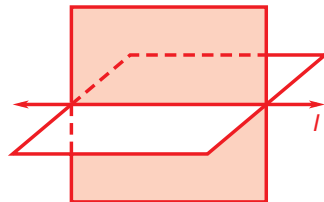
According to Postulate 4, two planes must intersect in a line.

**✓ Checkpoint** Sketch the figure described.

7. Two lines that intersect a plane at the same point.



8. Two planes that intersect in a line.



9. Two planes that do not intersect.

